

### Claims

1. Large area structural element (10) containing a plurality of body segments (11) of a foamed, thermoplastic material that are arranged next to each other and joined together on a plane,  
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characterised in that,  
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the structural element (10) is made wholly of plastic and the body segments (11) are welded together at their abutting side faces forming weld seams (12, 13), whereby the weld seams (12, 13) form a low-pore or pore-free intermediate plastic layer in the form of a network of stiffening struts – as seen viewing the large area structural element (10) in plan  
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view.
2. Large area structural element according to claim 1, characterised in that the body segments are made of a closed-cell foam material.
- 20 3. Large area structural element according to one of the claims 1 to 2, characterised in that the large area structural element (10) is made of thermoplastic material, preferably of a polyethylene-terephthalate (PET) or a styrene/acrylonitrile-copolymer (SAN).
- 25 4. Large area structural element according to one of the claims 1 to 3, characterised in that the weld seams (12, 13) are made up of melted plastic of the body segments (11).
- 30 5. Large area structural element according to one of the claims 1 to 4, characterised in that the thickness of the weld seams (12, 13) is such that the network-like strut structure formed by the weld seams increases the compressive strength of the structural element (10) with respect to sur-

face pressure.

- 5      6.      Large area structural element according to one of the claims 1 to 5, characterised in that the body segments (11) are lengths cut from rod-shaped or column-shaped foam bodies (7).
- 10     7.      Large area structural element according to claim 6, characterised in that the rod-shaped or column-shaped foam bodies (7) are manufactured by means of extrusion, and the direction of extrusion in the body segments (11) manufactured from the foam bodies (7) lies parallel or essentially parallel to the line of intersection of two crossing weld seam faces (12, 13).
- 15     8.      Large area structural element according to claim 7, characterised in that the body segments (11) feature stretching of the polymer structure in the direction of extrusion.
- 20     9.      Large area structural element according to one of the claims 1 to 8, characterised in that body segments (11) are fitted together without interruption, and the body segments (11) exhibit a cross-section which enables the body segments to be fitted together without interruption.
- 25     10.     Large area structural element according to one of the claims 1 to 9, characterised in that body segments (11) – as viewing the large area structural element (10) in plan view – exhibit a polygonal shape, preferably an eight-side, six-sided, four-sided or triangular shape.
- 30     11.     Large area structural element according to one of the claims 1 to 9, characterised in that the large area structural element (10) is a plastic sheet.
12.     Process for manufacturing a large area structural element (10) containing a plurality of body segments (11) arranged adjacent to one another in a

plane, interconnected and made of a foamed plastic according to claim 1,

characterised by way of the following steps:

- 5           a)    manufacture of closed-cell rod-shaped or column-shaped foamed plastic bodies (7);
- b)    welding together the long sides of the rod-shaped or column-shaped foamed bodies (7) into a plastic block (5) thus creating weld seams (32, 33) over that face, whereby the said weld seams (32, 10           33) are then present as low-pore or pore-free intermediate plastic layers;
- c)    dividing the block (5) of foamed plastic into individual large area structural elements (30), in particular foam sheets, running transverse or perpendicular to the longitudinal direction of the rod-shaped foam bodies (7), 15           whereby the weld seams (32, 33), as viewed in plan view of the structural element (30), form a network like structure of struts.
13.       Process according to claim 12, characterised in that the rod-shaped or 20           column-shaped foam bodies (7) are manufactured by means of an extrusion process.
14.       Process according to claim 13, characterised in that the rod-shaped or 25           column-shaped foam bodies (7) are manufactured using a polymer chain structure that is stretched in the direction of extrusion.
15.       Process according to one of the claims 12 to 14, characterised in that the 30           weld joint is formed by melting the faces of the sides of the body segments (11) that are to be joined and subsequently fitting these together and solidifying them.
16.       Process according to claim 15, characterised in that means for controlling

the melting process during welding is provided and which enable weld seams (12, 13) of a specific thickness range to be produced such that the network-like strut structure of weld seams (12, 13) increases the compressive strength of the structural element (10) with respect to surface pressures.

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17. Process according to one of the claims 12 to 16, characterised in that the large area structural element (10) is of a thermoplastic material and the welding of the body segments (11) is a thermoplastic welding process.

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18. Use of the large area structural element (10) according to one of the claims 1 to 11 in a structural component (1) with an outer layer (2) deposited on at least one surface of the large area structural element (10).

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19. Use of the large area structural element (10) according to claim 18 as core layer in a structural component (1), characterised in that the structural component (1) is a sandwich type composite element, in particular a sandwich composite sheet with outer layers (2, 3) on both sides of the core layer.

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20. Use of the sandwich composite element (1) according to claim 19 for manufacturing vanes in wind powered generating units.